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| 09/702,667 | 11/01/2000 | Mariana Munteanu | 50103-337 | 9652 |

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| EXAMINER |
|------------------|
| BERNATZ, KEVIN M |

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 1773 | |

DATE MAILED: 10/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Applicati n N . | | Applicant(s) | |
| | 09/702,667 | | MUNTEANU ET AL. | |
| | Examin r | | Art Unit | |
| | Kevin M Bernatz | | 1773 | |

-- The MAILING DATE of this communicati n appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on ____.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-7 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5) ☐ Claim(s) ____ is/are allowed.

6) ☒ Claim(s) 1-7 is/are rejected.

7) ☐ Claim(s) ____ is/are objected to.

8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some * c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. ____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

| | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 6) <input type="checkbox"/> Other: . |

DETAILED ACTION

Response to Amendment

1. Preliminary amendments to the specification, filed on August 6, 2001, have been entered in the above-identified application.

Oath/Declaration

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because: the current oath or declaration contains an erroneous claim for priority. The present declaration contains a claim for priority to provisional application 60/164,168 (filed 11/3/1999 - sic). It appears that this was an incorrect application number, as evidenced by Paper No. 3, where applicants correct the claim of priority to provisional application 60/163,371.

The claim to priority to provisional application '168 is improper because application '168 does not have a common inventor with the present application and was also filed on November 9, 1999, not November 3, 1999 (see 35 USC 119(e)).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohkijima et al. (U.S. Patent No. 5,736,262).

Regarding claims 1 and 7, Ohkijima et al. disclose a magnetic recording medium comprising a non-magnetic substrate, an underlayer on a non-magnetic substrate, a first magnetic intermediate layer on the underlayer and a second magnetic layer on the intermediate layer; wherein the second magnetic layer exhibits a higher magnetic saturation (Ms) than the intermediate layer (col. 1, lines 55 – 63; col. 5, lines 3 – 13; and Table 1; e.g. example 26 which has an intermediate layer with an Ms of 16 ($B_s = 4\pi M_s$) and a second magnetic layer with an Ms of 438).

Regarding the limitation “the first magnetic layer exhibits a higher signal-to-media noise ratio (SMNR) than the second magnetic layer”, it has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily or inherently possess characteristics of claimed products where the rejection is based on inherency under 35 USC 102 or on *prima facie* obviousness under 35 USC 103, jointly

or alternatively. Therefore, the *prime facie* case can be rebutted by **evidenc** showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

In the instant case, Ohkijima et al. disclose a prior art product possessing substantially identical structure to the claimed product. In addition, Ohkijima et al. example 26 disclose an embodiment wherein the Cr content in the lower layer is greater than the Cr content in the upper layer, wherein it is known in the art that a higher Cr content leads to improved SMNR performance (applicants' admissions, page 4, lines 15 – 16).

Therefor, the examiner deems there is sound basis for believing that the prior art product, exemplified by example 26, would inherently meet applicants' claimed limitation in that the first intermediate layer would exhibit a higher SMNR than the second magnetic layer. The examiner notes that there is currently no evidence of record showing that the disclosed prior art product (e.g. example 26) does not necessarily possess the characteristics of the claimed product.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 and 5 – 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moroishi et al. (U.S. Patent No. 5,900,324) in view of Miyazaki et al. (U.S. Patent No. 5,558,945) and Zhang et al. (IEEE Trans. Mag., 32(5), 1996, 3590 – 3592).

Regarding claims 1 and 7, Moroishi et al. disclose a magnetic recording medium comprising a non-magnetic substrate, an underlayer on a non-magnetic substrate, a first magnetic layer on the underlayer and a second magnetic layer on the first magnetic layer (col. 5, lines 9 – 16 and Figure 1).

While Moroishi et al. disclose the importance of controlling the crystal structure of the magnetic layer directly deposited on the underlayer in order to reduce the overall medium noise (col. 2, line 63 bridging col. 3, line 38), Moroishi et al. fail to disclose the first magnetic layer exhibiting a higher SMNR than the second magnetic layer.

However, Zhang et al. teach a double layered magnetic recording media wherein the “bottom-layer film not only seeds the microstructure for the upper-layer film, but also determines the noise characteristics of the double layer film” (Abstract), wherein the preferred structure comprises a first magnetic layer possessing a higher SMNR than the second magnetic layer (Table 1, Series A and B and Results and Discussion).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Moroishi et al. to utilize a first magnetic layer exhibiting a higher SMNR than the second magnetic layer as taught by Zhang et al. in order to reduce the overall medium noise, since the first magnetic layer determines the overall noise characteristics of the double layer film.

Neither Moroishi et al. nor Zhang et al. disclose the second magnetic layer exhibiting a higher M_s than the first magnetic layer.

However, Miyazaki et al. teach a double layered magnetic recording medium wherein the second magnetic layer exhibits a higher M_s than the first magnetic layer (Abstract and col. 2, lines 42 – 50) in order to produce a recording medium possessing good output over a range of low to high density, as well as good still and electromagnetic characteristics (col. 1, lines 5 – 10 and col. 2, lines 23 – 27).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Moroishi et al. in view of Zhang et al. to utilize a second magnetic layer possessing a higher M_s than the first magnetic layer as taught by Miyazaki et al. in order to produce a recording medium possessing good output over a range of low to high density, as well as good still and electromagnetic characteristics.

Regarding claim 5, Moroishi et al. disclose underlayers meeting applicants' claimed limitations (col. 13, lines 18 – 24 and Figure 1).

Regarding claim 6, Moroishi et al. disclose the first underlayer comprising Cr or any body-centered cubic close-packed crystalline structure (col. 10, lines 38 – 47; col.



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13, lines 18 – 24; and Figure 1) and the examiner has deemed “Cr” to read on “Cr alloy” given applicants’ disclosure regarding suitable composite underlayers comprising a first Cr alloy layer and second Cr alloy layer, wherein Cr is disclosed as suitable for the second underlayer (page 9, lines 5 – 13).

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moroishi et al. in view of Miyazaki et al. and Zhang et al. as applied above (hereafter this combination of references will be referred to as MMZ et al.), and further in view of Yoshikawa et al. (U.S. Patent No. 6,274,233 B1), applicants’ admissions and Song et al. (IEEE Trans. Mag., 30(6), 1994, 4011 – 4013).

MMZ et al. is relied upon as described above.

MMZ et al. fail to disclose the alloy compositions for the first and second magnetic layers, as claimed by applicants, though MMZ et al. do disclose CoCrPt alloys comprising Ta and/or B (Moroishi et al., col. 6, lines 1 – 4).

Regarding claim 2, Yoshikawa et al. teach a dual layered magnetic recording medium comprising a first and second magnetic layer containing Co, Cr and Pt (Table 2, Test Example 37), wherein the first in-plane magnetic layer has a higher Cr content than the second vertical magnetic layer (20% vs. 18%), and the second vertical magnetic layer has a higher Co content than the first in-plane magnetic layer (73 % vs. 67%). Yoshikawa et al. disclose that such an embodiment results in the highest SMNR (16.1 dB) and coercivity (2820 Oe).

The examiner further deems that one of ordinary skill in the art at the time of applicants' invention would have been motivated to use a higher Cr content in the first magnetic layer in view of applicants' admissions that increased Cr content results in increased SMNR (page 4, lines 15 – 16) and the teachings of Zhang et al. that the lower magnetic layer controls the overall SMNR properties of the medium (see Paragraph 6, above).

In addition, the examiner deems that one of ordinary skill in the art would have also been motivated to use a second magnetic layer possessing a higher Co content in view of the teaching in Song et al. that increased Co content results in increased Ms (Table 1, wherein 86% Co yields a Ms of ~530 emu/cc vs. 84% Co, which yields a Ms of only ~420 emu/cc), given the known teaching to utilize a second magnetic layer possessing a higher Ms than the first magnetic layer (see Paragraph 6, above).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of MMZ et al. to utilize a first and second magnetic layer comprising Co, Cr and Pt, wherein the magnetic layers have a Cr and Co content meeting applicants' claimed limitations as taught by Yoshikawa et al., especially in view of applicants' admissions and Song et al., in order to produce a magnetic recording medium possessing improved SMNR, coercivity and good output over a range of low and high density.

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8. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moroishi et al. in view of Miyazaki et al., Zhang et al., Yoshikawa et al., applicants' admissions and Song et al. as applied above (hereafter this combination of references will be referred to as MMZYAS et al.), and further in view of Bian et al. (U.S Patent No. 6,143,388).

MMZYAS et al. is relied upon as described above. Furthermore, Yoshikawa et al. disclose a first magnetic layer meeting applicants' claimed Cr and Pt content (col. 8, lines 3 – 7 and Example 37: 20 % Cr and 8% Pt) and a second magnetic layer meeting applicants' claimed Cr, Pt and Ta content (col. 8, lines 27 – 31 and Example 37: 6% Pt and 3% Ta). In addition, Song et al. teach using a CoCrPtB first magnetic layer followed by a CoCrPtTa second magnetic layer, which results in a medium possessing the highest coercivity (Figure 2).

Regarding claims 3 and 4, MMZYAS et al. fail to disclose an embodiment wherein the first magnetic layer contains about 6 to about 8 at% boron (claim 3) and the second magnetic layer contains about 12 to about 16 at% Cr (claims 3 and 4) and about 6 to about 8 at% boron (claim 4).

However, Bian et al. teach dual layered magnetic recording media possessing magnetic layers containing CoCrPtTa and CoCrPtB alloys overlapping applicants' claimed alloy percentages (col. 3, lines 52 – 55; col. 5, lines 4 – 6; and see Table below), wherein the amounts of the various elements are controlled to optimize lattice parameters, surface energies and degradation (col. 4, lines 26 – 30). Regarding claim 4, Bian et al. further teach the equivalence between using a CoCrPt alloy with B or with

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Ta (col. 3, lines 44 – 45), wherein the amount of Ta (if Ta is used) meets applicants' claimed limitations for the second magnetic layer (claim 3) and the amount of B (if B is used) also meets applicants' claimed limitations for the second magnetic layer (claim 4).

Table Comparing Claimed and Prior Art CoCrPt Alloys

| Element | 1 st Mag. Layer (<i>claims 3 + 4</i>) | Bian et al. CoCrPtB | 2 nd Mag. Layer (<i>claim 4</i>) | 2 nd Mag. Layer (<i>claim 3</i>) | Bian et al. CoCrPtTa |
|---------|---|------------------------|--|--|-------------------------|
| Cr | ~20 - ~22 | 10 - 23 | ~12 - ~16 | ~12 - ~16 | 10 - 23 |
| Pt | ~8 - ~10 | 4 - 12 | ~6 - ~12 | ~6 - ~12 | 4 - 14 |
| Ta | None | None | None | ~2 - ~4 | 1 - 5 |
| B | ~6 - ~8 | 2 - 10 | ~6 - ~8 | None | None |

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of MMZYAS et al. to use a CoCrPtB first magnetic layer and either a CoCrPtTa (claim 3) or the equivalent CoCrPtB (claim 4) second magnetic layer as taught by Bian et al. and Song et al. in order to produce a medium possessing a high coercivity. Furthermore, it would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the exact Cr, Pt, Ta and B content of the various magnetic layers through routine experimentation, especially given the teachings in Bian et al. regarding typical alloy compositions for CoCrPtTa and CoCrPtB magnetic alloys. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moroishi et al. in view of Miyazaki et al. and Zhang et al. as applied above (hereafter this combination of references will be referred to as MMZ et al.), and further in view of Ross et al. (U.S. Patent No. 6,156,404).

MMZ et al. is relied upon as described above. Specifically, MMZ et al. teach a bcc first underlayer comprising Cr and a second underlayer comprising a CrMo alloy.

Should one of ordinary skill in the art not readily envision the embodiment wherein the first underlayer comprises a Cr alloy different than the second Cr alloy, Ross et al. teach a dual layered underlayer comprising a sublayer and a Cr underlayer (col. 4, lines 11 – 33 and col. 13, lines 33 - 37) wherein the sublayer comprises bcc Cr or Cr alloys (col. 7, lines 19 – 26). Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, Ross et al. teach the equivalence of bcc Cr and bcc Cr alloys in the field of first underlayers in a dual underlayer structure. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). Furthermore, the examiner notes that the composition of the first underlayer would inherently be different than the second underlayer or the net result would simply be a single underlayer of a single composition, albeit deposited at two separate intervals. The examiner also notes that the bcc Cr alloys explicitly listed in Ross et al. for use as the first underlayer do not include CrMo (col. 7, lines 23 – 25:

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"Other BCC materials include Cr with less than 30 atomic % Ti, Ni, Al, Si or Co"), which is the alloy used as the second underlayer.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of MMZ et al. to include a first and second underlayer comprising Cr-alloys meeting applicants' claimed limitations as taught by Ross et al. since bcc Cr alloys are known equivalents to bcc Cr for use as first underlayers and the composition of the underlayers would inherently be different or there would only be a single underlayer.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.



KMB

October 10, 2002



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700